Experiment - 3

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Branch: BE-CSE **Section/Group: KRG 2B**

Semester: 6th **Date of Performance: 31/01/25**

Subject Name: Java **Subject Code: 22CSH-352**

1. **Aim: Develop a program for**

   a) Easy Level: Square Root Calculation

   b) Medium Level: ATM Withdrawal System

   c) Hard Level: University Enrollment System

2. **Implementation/Code:**

a)

```
import java.util.Scanner;
public class SquareRootCalculator {
public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
    System.out.print("Enter a number: ");

    try {
        double num = scanner.nextDouble();
        if (num < 0) {
            throw new IllegalArgumentException("Error: Cannot calculate the square
```

```
            root of a negative number.");
                }
                System.out.println("Square Root: " + Math.sqrt(num));
            } catch (IllegalArgumentException e) {
                System.out.println(e.getMessage());
            } catch (Exception e) {
                System.out.println("Error: Invalid input. Please enter a numeric value.");
            } finally {
                scanner.close();
            }
        }
```

b)

```
import java.util.Scanner;

class InvalidPinException extends Exception {
    public InvalidPinException(String message) {
        super(message);
    }
}

class InsufficientBalanceException extends Exception {
    public InsufficientBalanceException(String message) {
        super(message);
    }
}

public class ATM {
    private static final int PIN = 1234;
```

```
    private static double balance = 3000.0;

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        try {
            System.out.print("Enter PIN: ");
            int enteredPin = scanner.nextInt();
            if (enteredPin != PIN) {
                throw new InvalidPinException("Error: Invalid PIN.");
            }

            System.out.print("Withdraw Amount: ");
            double withdrawAmount = scanner.nextDouble();

            if (withdrawAmount > balance) {
                throw new InsufficientBalanceException("Error: Insufficient balance. Current
Balance: " + balance);
            }

            balance -= withdrawAmount;
            System.out.println("Withdrawal successful! Remaining Balance: " + balance);

        } catch (InvalidPinException | InsufficientBalanceException e) {
            System.out.println(e.getMessage());
        } catch (Exception e) {
            System.out.println("Error: Invalid input.");
        } finally {
            System.out.println("Final Balance: " + balance);
            scanner.close();
        }
    }
```

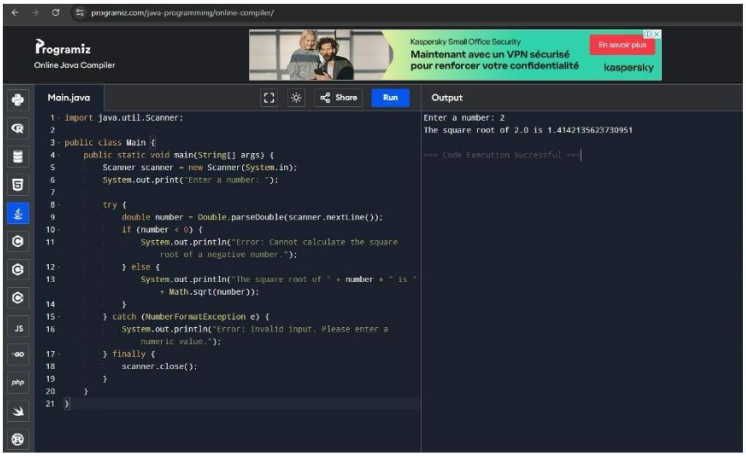
c)

```
import java.util.HashMap;
import java.util.Scanner;

class CourseFullException extends Exception {
    public CourseFullException(String message) {
        super(message);
    }
}

class PrerequisiteNotMetException extends Exception {
    public PrerequisiteNotMetException(String message) {
        super(message);
    }
}

public class UniversityEnrollment {
    private static final int MAX_ENROLLMENT = 2;
    private static HashMap<String, Integer> courseEnrollments = new HashMap<>();
    private static HashMap<String, String> prerequisites = new HashMap<>();

    public static void main(String[] args) {
        // Defining course prerequisites
        prerequisites.put("Advanced Java", "Core Java");
        prerequisites.put("Machine Learning", "Mathematics");

        Scanner scanner = new Scanner(System.in);

        try {
            System.out.print("Enroll in Course: ");
            String course = scanner.nextLine();
```

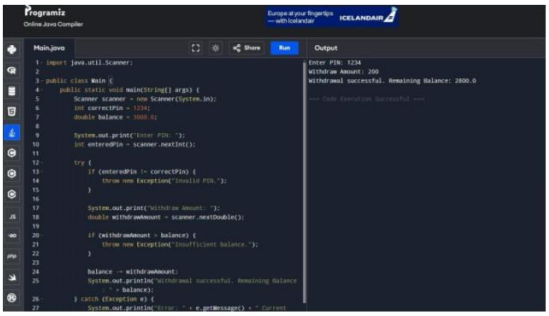
```
            System.out.print("Prerequisite: ");
            String prerequisite = scanner.nextLine();

            if (prerequisites.containsKey(course) &&
!prerequisites.get(course).equals(prerequisite)) {
                throw new PrerequisiteNotMetException("Error: PrerequisiteNotMetException
- Complete " + prerequisites.get(course) + " before enrolling in " + course + ".");
            }

            int enrolledCount = courseEnrollments.getOrDefault(course, 0);
            if (enrolledCount >= MAX_ENROLLMENT) {
                throw new CourseFullException("Error: CourseFullException - The course is
full.");
            }

            courseEnrollments.put(course, enrolledCount + 1);
            System.out.println("Enrollment successful for " + course + ".");

        } catch (PrerequisiteNotMetException | CourseFullException e) {
            System.out.println(e.getMessage());
        } finally {
            scanner.close();
        }
    }
}
```

3. **Output:**

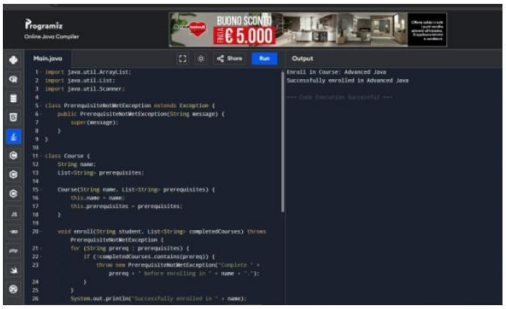
(a)



(a)



(b)



(c)

6. Learning Outcomes:

- ✓ Exception Handling & Robust Code – Learn to use try-catch, throw, and custom exceptions for handling errors like invalid input, insufficient balance, and unmet prerequisites.
- ✓ User Input & Decision Making – Gain experience in handling user inputs, validating conditions (PIN check, balance check, prerequisites), and controlling program flow.
- ✓ OOP & Data Management – Understand object-oriented principles like custom exception classes and use data structures (e.g., HashMap) for managing enrollments dynamically.